# Black-Headed Budworm



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The black-headed budworm is the most significant defoliator of the coastal spruce-hemlock forests of Alaska. This insect is common in southwest Alaska, the Prince William Sound area, and throughout southeast Alaska. The black-headed budworm's preferred host is western hemlock, but Sitka spruce and mountain hemlock are also frequently fed upon.

*Figure 1. Budworm defoliation along the same slope, 1953 (top) and 1992, Lemon Creek area, Juneau, AK.*

During budworm outbreaks, both forest and ornamental trees are attacked.

Black-headed budworm populations in Alaska have been cyclic, rising quickly over a few years, covering vast areas, and then subsiding suddenly. Recurrent infestations have been noted in southeast Alaska since the early 1900's (Fig. 1). An outbreak in the late 1940's to mid-1950's, affected almost every forested acre in southeast Alaska.

This leaflet provides information about the life history of black-headed budworm and includes several treatment options.

**Identification**

During early development stages, budworm larvae are creme-colored with a distinct black head. Their body color changes to green as they develop and the head capsule is brown during the last development stage (Fig. 2).

*Figure 2. Mature budworm larva with brown head capsule.*

Mature larvae are one-half to three-quarters inch long. Pupae are green or brown and are approximately one-third inch in length (Fig. 3). The adult is a small moth with a three-quarter inch wingspan (Fig. 4). Moths show great variability in wing color and pattern. The predominant wing color is grey, with mixtures of brown, black, orange and white. Eggs are yellow, flat, and are laid singly on the underside of host needles (Fig. 5)

*Figure 3. Black-headed budworm pupa.*

*Figure 4. Black-headed budworm adult (moth). Wing color and pattern is variable.*

**Life history**
Black-headed budworms overwinter as eggs. The eggs hatch in late May or June and young larvae begin feeding in unopened buds. Larval feeding and growth coincides with the host's bud and shoot development. Budworm feeding is typically confined to the current year's needles. Defoliation of older needles is an indication of large budworm populations. In their last stage of development, larvae build a pupation shelter by webbing live and cut needles together. Pupation occurs from mid-July to mid-August. Moths emerge, mate, and female moths deposit eggs from late August through September.

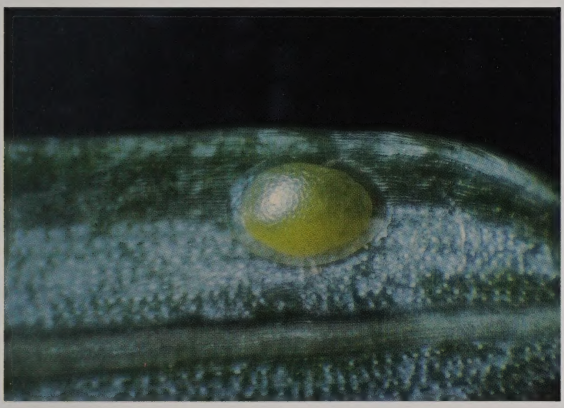

*Figure 5. Black-headed budworm egg on the underside of a western hemlock needle.*

**Impact**
Budworms are wasteful feeders, often clipping loose needles that are not completely consumed. By mid-summer, these needles have dried and turn red. Crowns of heavily defoliated trees appear scorched due to large

concentrations of dead, dry needles (Fig. 6). Defoliation is most severe in the upper portions of tree crowns, but entire crowns may defoliated during budworm outbreaks.

A single year of defoliation often causes reduced tree growth. Years of repeated defoliation may result in reduced cone production, top-kill, or in severe cases, death of the tree.

Not all impacts of budworm defoliation are negative. Foliage ingestion hastens nutrient cycling and crown density reduction may increase light intensity to the ground. However, negative impacts to managed young growth forests and to urban ornamentals often outweigh potential benefits.

*Figure 6. Heavy defoliation of young western hemlock and Sitka spruce.*

**Control**

Large-scale control of the black-headed budworm in forest settings in Alaska has not been attempted. Control measures to protect high value ornamentals in urban settings may

however, be desirable. Control measures for black-headed budworm vary, based on degree of infestation and the size and setting of impacted trees.

No control may be necessary when budworm populations are low and their feeding damage is insignificant. A simple form of control for small, lightly infested ornamentals, is to physically remove infested shoots. Use of insecticides may be desireable to protect heavily infested trees. Both biological and chemical insecticides are registered for budworm control. Spray applications (e.g., carbaryl) have proven effective in reducing budworm defoliation when applied after bud break. A potential control method that is currently being studied, is the use of insecticide implants (e.g., acephate). These implants are effective in protecting individual trees from a similar defoliator, the western spruce budworm. Biological insecticides (e.g., the bacterium, *Bacillus thuringiensis* (B.t)), have also been used against budworms, but proper timing of application is critical to achieve adequate control.

Natural controls of budworm populations vary by budworm life stage. Predators of larvae (and in some cases, moths) include birds, spiders and several species of insects. Some wasps parasitize budworm eggs, larvae and pupae. An unusual impact to overwintering budworm eggs is their removal by snow, as it slides from tree branches. A virus, fungi, larval starvation, and weather have also been noted as having contributed to budworm population declines.

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Additional information on this insect can be obtained from your local USDA Cooperative Extension Service office, Alaska Division of Forestry office, or from:

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